IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A safety protection instrumentation system for a nuclear reactor constructed by using a digital logic, wherein the digital logic comprises:

a plurality of functional units having logic circuitry in which output logic patterns resulting from input logic patterns have been verified in advance of installation of the logic circuitry in the safety protection system; and

a functional module formed by combining the plurality of functional units so as to form a logic structure in which the logic structure of the combination of the plurality of functional units is different from the logic structure of each of the plurality of functional units individually, wherein,

the functional module includes only functional units having a same logic circuit gate structure as that of a functional unit whose performance has been verified in advance, and

software which describes effective programs statements executed by hardware and input pattern groups indicating operation paths, uses branch coverage or toggle coverage for evaluating the ratio of the input logic patterns, and determines whether the output logic patterns corresponding to the input logic patterns coincide with predicted patterns calculated from design specifications to verify that the functional units are correctly connected to each other.

Claim 2 (Previously Presented): The safety protection instrumentation system according to claim 1, wherein, each of the functional units individually implements the output logic patterns resulting from the input logic patterns solely on hardware, and determines whether the output values coincide with predicted values calculated from design specifications.

Claim 3 (Canceled):

Claim 4 (Previously Presented): The safety protection instrumentation system according to claim 1, wherein the functional module formed by a combination of the plurality of functional units further comprises:

a register through which an output from at least one functional unit is transmitted; and

a delay element used for adjusting the timing of signal processing in the functional unit.

Claim 5 (Previously Presented): The safety protection instrumentation system according to claim 1, wherein the functional module formed by a combination of the plurality of functional units further comprises:

a register through which an output from at least one functional unit is transmitted,

wherein the system uses handshaking for transferring a signal from the functional unit that drives the register at different clock frequencies, among the functional units.

Claim 6 (Canceled).

Claim 7 (Original): The safety protection instrumentation system according to claim 1, wherein the safety protection instrumentation system is structured so as to generate input patterns in accordance with design specifications of the functional module and to determine whether the output patterns corresponding to the input patterns in the functional module coincide with predicted values calculated from the design specifications.

Claim 8 (Previously Presented): The safety protection instrumentation system according to claim 1, wherein the safety protection instrumentation system further comprises:

an analog-to-digital element that converts an analog signal pattern in accordance with design specifications of the functional module into a digital value to generate a digital input pattern; and

a digital-to-analog element that converts an output corresponding to an input in the functional module into an analog value,

wherein the system determines whether the analog value coincides with a predicted value calculated from the design specifications.

Claim 9 (Previously Presented): The safety protection instrumentation system according to claim 1, wherein the safety protection instrumentation system performs addition or comparison of two variables in the functional unit to replace either one of the two variables with a constant that can be specified with an address having a number of bits smaller than that of the variable.

Claim 10 (Previously Presented): The safety protection instrumentation system according to claim 1,

wherein the functional unit has a function of passing an operation flag indicating normal completion of the operation,

wherein the functional module has a function of monitoring the operation flag, and

wherein the safety protection instrumentation system further comprises:

a trip evaluator that receives an output from the functional module and determines whether the operation flag is set; and

an abnormality diagnosis circuit that outputs an abnormal operation signal if the operation flag is not set.

Claim 11 (Previously Presented): The safety protection instrumentation system according to claim 1,

wherein the functional unit has a function of calculating maximum and minimum output values by a simple expression and a function of passing the maximum and minimum output values, and

wherein the safety protection instrumentation system further comprises:

a trip evaluator that compares signal values with the maximum and minimum output values to determine whether the signal values are appropriate; and

an abnormality diagnosis circuit that outputs an abnormal operation signal.

Claim 12 (Previously Presented): The safety protection instrumentation system according to claim 1, wherein the safety protection instrumentation system further comprises:

a first safety protection instrumentation system that converts a digital output into an analog value and converts the analog value into an optical signal; and

a second safety protection instrumentation system that converts the optical signal into an analog value and converts the analog value into a digital value,

wherein the first safety protection instrumentation system is connected to the second safety protection instrumentation system.

Claim 13 (Currently Amended): A method of operating a safety protection instrumentation system for a nuclear reactor constructed by using digital logic, comprising:

verifying output logic patterns resulting from input logic patterns in functional units in the safety protection instrumentation system in advance of installation of the logic circuitry in the safety protection system; [[and]]

combining a plurality of functional units to form a functional module so as to form a logic structure in which the logic structure of the combination of the plurality of functional units is different from the logic structure of each functional unit individually wherein the functional module includes only functional units having a same logic circuit gate structure as that of a functional unit whose performance has been verified in advance;

describing effective programs statements executed by hardware and input pattern groups indicating operation paths;

using branch coverage or toggle coverage for evaluating the ratio of the input logic patterns; and

determining whether the output logic patterns corresponding to the input logic patterns coincide with predicted patterns calculated from design specifications to verify that the functional units are correctly connected to each other.

Claim 14 (Previously Presented): The method of operating a safety protection instrumentation system according to claim 13, further comprising:

serially performing data processing in the functional units in the safety protection instrumentation system in the order of connection;

confirming serial transmission of a signal by monitoring an output timing; and

determining whether the signal is output as designed to verify the performance of the safety protection instrumentation system.

Claim 15 (Previously Presented): The method of operating a safety protection instrumentation system according to claim 13, further comprising:

verifying whether the functional units in the safety protection instrumentation system have a same structure as an internal structure when performance of the functional units is verified.